School takeovers, leadership change, and personnel policy*

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Abstract

Failing, high-poverty public schools notoriously struggle to attract and retain good teachers. This paper studies a setting where successful businesses or educational charities take over the management of low-performing schools, while funding remains public. Exploiting the staggered expansion of English Sponsor-led academies since the early 2000s, we show that the new business-oriented management strongly innovates its personnel policy, leading to profound changes in the teaching body. The probability that the Sponsor appoints a new headteacher doubles upon the takeover, with the new headteacher being, on average, younger, better paid, and more likely to come from outstanding schools. The takeover also reverses a downward trend in students' and teachers' numbers. In turn, the composition of the teaching body changes towards younger and less experienced teachers, but also teachers who achieved top grades in education and are more likely to come from an outstanding school and the same school as the new head. Lastly, Sponsors substantially restructure teachers' rewarding scheme and abandon a pay scale entirely based on seniority and education, leading to a 10 percent increase in pay dispersion across equally experienced/educated teachers.

JEL codes: I28; J13; J18.
Keywords: school takeovers; academies; leadership; teacher turnover and pay.

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1 Introduction

While extensive literature shows that teachers are the most important input for students' outcomes (Rockoff 2004, Rothstein 2010, Chetty et al. 2014, Jackson 2018, Gibbons et al. 2021), one of the key challenges that disadvantaged schools face is how to attract and retain high-quality teachers (Clotfelter et al. 2008, Lavy 2008, Glazerman et al. 2013, Springer et al. 2016, Swain et al. 2019, Benhenda 2020, Bobba et al. 2021, Morgan et al. 2023). This paper considers a context where the management of low-performing, high-poverty public schools is taken over by businesses or charitable institutions, and studies how the injection of business-like practices, ethos, and goals affects the school leadership and teacher turnover, composition, and pay.

Over the last twenty years, English secondary schools have been allowed to acquire the status of charitable trusts called "academies" to gain autonomy from the local authority (LA) over major aspects of the school governance, such as the organization of the school curriculum, the structure of the school day and year, spending allocation, and teachers' pay and working conditions. What makes academies especially interesting to study is that the conversion process had been initially conceived as a remedial program for low-performing, disadvantaged schools (Eyles et al. 2017, Eyles and Machin 2019). When the Department for Education (DfE) identifies a failing school, it matches it with a *Sponsor*, usually a charity or business group, interested in taking over the management of the school. Upon the DfE's approval of the conversion application, while funding remains public, the Sponsor takes the lead of the school by nominating a board of trustees, who becomes responsible for managing the school budget, hiring and paying the headteacher and teachers, and setting the school's direction and ethos. For this reason, schools acquiring academy status through this route are called *Sponsor-led academies*, or *sponsored academies*.

The 2010 Academies Act introduced a simplified conversion process for better-performing schools that do not need to find a Sponsor to gain autonomy from the LA, which has led to a rapid expansion of school conversions in so-called *converter academies*. However, low-achieving schools have to follow the Sponsor route and, by the school year 2018/19, one third of secondary-school academies, or 21 percent of all secondary schools, have acquired the status of Sponsor-led

academy.[1] Importantly, while Andrews et al. (2017) show that converter academies had no significant impact on students' performance, there is ample evidence that the acquisition of school autonomy helped low-performing schools improve students' achievement and educational attainment (Eyles and Machin 2015, Eyles et al. 2016, Andrews et al. 2017). However, as in the case of charter schools in the US, it is still debated what the mechanisms behind these successful stories are (Adonis 2012, Angrist et al. 2013, Dobbie and Fryer Jr 2013, Fryer Jr 2014, Cohodes and Parham 2021, Silva et al. 2023). This paper focuses on the impact of these school takeovers on leadership change, and teacher turnover, composition, and pay.

To study how the conversion into sponsored academies affects these outcomes, we build a unique teacher-level panel data set spanning the entire period of academies' expansion, by combining the Database for Teachers Records (DTR), available from the school year 2001/02 until 2000/10, with the School Workforce Census (SWC), available since 2010/11 onward. The resulting data set provides information on teachers' demographic characteristics, part-time status, contractual annual pay, and any additional payments granted for specific responsibilities. Moreover, the data set provides the identifier of the school where the teacher works, which allows us to follow teachers from one school to another and link this data set to school-level data, providing, among other information, the timing of academy conversions. To identify causal effects, we adopt a difference-in-differences (DiD) strategy that compares the evolution of the outcomes of interest around the year of conversion (from 3 years before to two years after) in schools that experience the takeover in a certain year and schools that become sponsored academies a few years later. While we cannot argue that the timing of takeovers is random, treated and control schools are comparable along most dimensions before the takeover is initiated. Moreover, we perform several robustness checks to test the validity of our identification strategy, including controlling for local-authority specific time shocks, and using different conversion cohorts as control group.

Our results show that the school takeover completely transforms under-performing schools,

[1]The 2010 Academy Act also introduced the possibility for primary schools to become academies and, by the school year 2018/19, 30 percent have undergone the conversion, among which 8 percent of primary schools had followed the sponsor route.

which, in just a few years, are able to obtain outstanding grades by the independent inspection authority, the Office for Standards in Education (OFSTED hereafter). Importantly, both the probability of having an outstanding performance in teaching and in management increase, respectively, by 5 and 15 percentage points, or 4 to 6 times compared to the pre-takeover mean. How do Sponsors achieve such a large improvement? We identify three sets of mechanisms.

First, the probability that the Sponsor-manager appoints a new headteacher more than doubles the conversion year in treated vs. control schools, and, on average, it increases by 60 percent after the conversion period compared to the pre-takeover mean.[2] Importantly, the new headteacher tends to be younger (2 percent increase), better paid (7 percent increase), and, respectively, 2 to 3 times more likely to come from a different LA and an outstanding school (as certified by OFSTED).

Second, we show that once the takeover is initiated, there is large increase in teachers' separations, driven by older teachers and teachers who were less likely to be high-achievers in education, a result consistent with the hypothesis that the injection of business-like ethos pushes away low-performing teachers. Moreover, once the takeover is completed, the share of teachers leaving the school drops by 4 percentage points (p.p.), or 19 percent compared to the pre-conversion mean. In parallel, the school takeover leads to a 4 p.p. increase in the share of newly hired teachers, or 27 percent compared to the pre-conversion mean, with new teachers being twice as likely to be *Teach first* teachers, 70 percent more likely to come from an outstanding school, and 0.3 p.p. more likely to come from the same school as the new head (from a pre-conversion 0 probability).

Finally, the last mechanism that could explain the stunning improvement in OFSTED performance of Sponsor-led academies concerns the management of pay policy. Running teacher-level regressions that control for teacher-fixed effects, on top of school- and year-fe, we show that Sponsors substantially restructure teachers' rewarding scheme, by decreasing the share of teachers'

[2] Eyles and Machin (2019) provide some preliminary evidence that the first sponsored academies, i.e. school takeovers taking place in the early 2000s, improved OFSTED performance, changed their headteacher and increased the number of teachers. We substantially expand this analysis by covering the entire period of expansion of sponsored academies and using individual-level teachers data, which allows us to study the impact of the school takeover on the headteacher's characteristics, teacher turnover, composition and pay. As for OFSTED we look at overall effectiveness as well as performance in teaching and management.

salary associated to payments for specific tasks - such as coordinating teachers of a certain subject, or supervising specific projects - and increasing, on average, teachers' base pay. Moreover, the new management abandons a pay scale entirely based on seniority and education, as pay dispersion across equally experienced/educated teachers increases by 10 percent after the takeover.

These results contribute to different strands of the literature. First, our paper contributes to the studies analyzing the impact of management flexibility on students' achievement. While a consolidated number of papers shows that autonomous schools are generally effective at raising student achievement (Hoxby and Rockoff 2004, Bohlmark and Lindahl 2007, Hoxby and Murarka 2008, Clark 2009, Dobbie and Fryer Jr 2011, Dobbie and Fryer Jr 2015, Abdulkadiroğlu et al. 2016, Eyles et al. 2016, Eyles and Machin 2019, Dobbie and Fryer 2020, Cohodes et al. 2021), the literature is still debating about the mechanisms behind these positive effects (Dobbie and Fryer Jr 2013, Angrist et al. 2013, Fryer Jr 2014, Cohodes and Parham 2021). Studying the impact of school autonomy on the teacher labor market seems key in this respect. A few studies offer insightful descriptive analysis on the characteristics of teachers moving to charter schools (Baker and Dickerson 2006, Carruthers 2012), while Jackson (2012) studies the impact of charter schools on teacher quality in surrounding public schools. However, to the best of our knowledge, no comprehensive analysis exists on the causal impact of management flexibility on teacher turnover, composition, and pay, and this paper aims to fill this gap.

Second, the paper adds to the few but increasing number of papers that study the impact of collective bargaining reforms on teacher turnover and pay, and students' performance (Hoxby 1996, Lovenheim and Willén 2019, Biasi 2021, Biasi et al. 2021, Biasi and Sarsons 2022, Burgess et al. 2022, Willén 2021). In a nutshell, this strand of the literature finds that granting school districts (or schools) pay flexibility leads to an improvement in students' performance. Relative to these studies, we focus on disadvantaged, low-performing schools and study the micro-management of personnel practices, including the impact on principals' selection.

Third, this paper also complements studies that analyze the impact of financial and non-financial incentives for teachers working in disadvantaged schools (Clotfelter et al. 2008, Lavy

2008, Glazerman et al. 2013, Springer et al. 2016, Swain et al. 2019, Benhenda 2020, Bobba et al. 2021). Taken together, these studies show that both monetary bonuses and career-oriented incentives are effective at decreasing teacher turnover, but are often poorly targeted, have mixed effects on pupils' achievement, and are costly to scale up. Relative to these studies, we analyze the impact of delegating the management of struggling secondary schools to charities or businesses with expertise in the educational sector. This policy has been scaled up nationally in the last 20 years. Whether these school takeovers help disadvantaged schools reduce teacher turnover is a priori unclear, and this paper offers a first answer.

Finally, by studying the impact of a drastic change in the management of struggling public schools, our paper relates to the broader literature on public sector managers on employees' selection and productivity (Bloom et al. 2015, Fryer et al. 2017, Fenizia 2022, Lavy et al. 2023).

The paper proceeds as follows. Section 2 describes English Sponsor-led academies. Section 3 presents the data and summary statistics. Section 4 illustrates the identification strategy. Section 5 presents the empirical analysis of the impact of school takeovers on OFSTED performance, headteacher's selection, teacher turnover and composition, and Sponsors' pay policy. Section 6 concludes.

2 Institutional setting

In the school year 2018/2019, 22 percent of English secondary schools are so-called sponsored academies, that is independent state-funded schools that are usually takeovers of low-performing, high-poverty schools. The idea of creating this institutional model emerged in the early 2000s, when a mounting consensus emerged in the English educational community that many secondary schools, and especially those located in poor urban neighborhoods, were failing to provide an adequate educational level to their pupils. To tackle this situation, the first Blair government opted for ingesting business-like practices, ethos, and goals into low-performing schools. This idea was based on the small-scale experience of the 15 "City Technology Colleges" (CTCs) created at the

end of the 1980s as new independent state-funded schools managed by businesses and geared towards science, mathematics, technology. Compared to CTCs, the Blair government decided to focus on existing failing, disadvantaged schools and envisaged a large-scale system whereby a broader set of Sponsor-managers, including successful businesses, educational charities, but also universities or successful schools, would take over the management of the school from the Local Authority, while continuing to receive public funding directly from the State (Adonis 2012).

The school takeover works as follows. An organization or individual interested in taking over the management of a school submits an expression of interest to the DfE, where it has to demonstrate it has the skills and expertise to help schools improve. If approved, the DfE matches this so-called *Sponsor* with a low-performing school, usually located in the same area where the Sponsor operates. The takeover is completed once the Sponsor obtains the DfE's approval to convert the school into a charitable trust, a process that takes on average one year and a half. Upon conversion, the Sponsor nominates a board of trustees, usually composed of educational experts, that becomes the decision-making body of the trust.

The conversion grants the Sponsor full autonomy from the LA in terms of the organization of the school curriculum, the structure of the school day and year, spending allocation, headteachers and teachers' hiring, pay and working conditions. In exchange for these freedoms, the Sponsor needs to offer a long-term commitment to run the school and improve pupils' outcomes. Also, the Sponsor cannot set selective admission criteria, nor charge fees. Importantly, the converted school remains publicly funded, and the DfE also provides a one-off grant of around £400K on average to cover the costs of the conversion process.

Students already enrolled in the school are granted a seat at the converted school. Similarly, teachers already employed at the school are guaranteed their job at the academy, and retain the pay and working conditions negotiated with the original school. However, the sponsor-managed school can negotiate different pay and conditions for newly hired teachers. Finally, sponsor-managed schools are subjected to the same accountability mechanisms of LA-managed schools, including regular inspections by the independent authority OFSTED.

The first three school takeovers took place in the school year 2002/03, and by December 2003 the government set a goal to have at least 200 Sponsor-led academies by 2010. Over the following years, the program scaled up: by September 2010, 270 academies were running.

To boost school autonomy at every level of the educational system, the Academies Act, issued in May 2010 by the newly elected Conservative government, introduced a new and simplified conversion route in both the primary and secondary phases. In particular, schools willing to convert under this route did not have to find a Sponsor anymore, and for this reason, the new autonomous schools were simply named *converter academies*. Importantly, however, at both primary and secondary level, low-performing schools, and specifically, schools deemed "inadequate" by OFSTED had to follow the sponsor route. As shown in Figure 1, by the school year 2018/19, 46 (22) percent of secondary (primary) schools have acquired the status of converter academy and 21 (8) percent have been converted into sponsored academies.

This paper focuses on Sponsor-led academies for two reasons. First, the fact that Sponsors take over the management of failing, high-poverty schools makes this institutional model especially important to study from a policy point of view. Second, we want to investigate to what extent the positive effects that sponsored academies have had on students' outcomes could in part be explained by the impact of the school takeover on the governance and personnel policy promoted by the Sponsor (Eyles et al. 2016, , Andrews et al. 2017, Eyles and Machin 2019).

3 Data and Summary Statistics

To study how the injection of business-like practices, ethos, and goals affects the school leadership and teacher turnover, composition, and pay, we built a unique individual-level teacher panel data set spanning the entire period of school takeovers, by combining the Database of Teacher Records (DTR) with the School Workforce Census (SWC). The DfE has used the DTR for the management of teachers' pension system since the early 1990s, and provides teachers' characteristics as of May of each school year. We have access to it from the school year 2001/02 to 2009/10. From the

school year 2010/11 onward, the DfE has discontinued access to the DTR, but has made available to researchers the SWC, a teachers' census conducted every year in November that focuses on state-funded schools and is supplemented with information on teachers' qualifications, subject taught, and absences. The DfE has created a unique anonymized teacher identifier for this project that allows us to follow the same teacher across the two data sets. Both data sets provide consistent information on teachers' roles in the school (classroom teacher vs. headteacher), gender, age, full-time status, qualified teacher status, teachers' annual gross and base pay and additional payments. The SWC also provides data on teachers' hours worked, full-time equivalent (FTE) pay, and tenure. It further distinguishes between additional payments given for (i) teaching and learning responsibilities (TLR), (ii) teaching to special education needs (SEN) children, (iii) recruitment and retention pay (iv) other payments, with TLR payments usually representing the largest share of additional payments. Note also that, because tenure is only available in the SWC, we calculate experience as years elapsed since the acquisition of qualified teacher status, which normally takes place just before or after starting the teaching career. This information is missing or not reliable for around 2 percent of the sample.

Both data sets also provide a consistent school identifier that we use to match them with school-level data. In particular, we merge the teacher data with publicly-available data extracted from "Get information about schools" (GIAS), a website managed by the DfE and covering all schools in England since the school year 2001/02. Among other things, GIAS provides key information on school phase, type, and LA identifiers, as well as information on pupils' characteristics, such as the percentage of students eligible for free school meal (FSM), the percentage of white British pupils, and the percentage of students whose English is their first language. We further supplement the resulting data set with: DfE data on schools' conversions, amalgamation and splits, which are crucial to follow a school overtime given that the school identifier changes when one of these events takes place; annual data on pupils' performance in standardized tests taking place at the end of high-school (11th grade) available from the school year 2005/06; official and standardized indicators of school quality, provided by the independent authority OFSTED, whose

inspectors periodically visit schools and issue scores regarding several dimensions, such as overall effectiveness, pupils' outcomes and behavior, and teaching and management quality; annual data on school resources and expenditure, also available from the school year 2005/06, and from 2010/11 for academies; annual data on median wages of individuals working in each LA from the Annual Population Survey (APS), available from the calendar year 2005.

Table 1 compares the characteristics of schools that never experience a sponsor-takeover over the period considered in this paper (Column 1), with the characteristics of schools that eventually convert to sponsored academies (Columns 2 and 3). We focus on the 600 academies that are conversions of pre-existing secondary schools for which we observe teachers' outcomes from at least 3 years before the takeover. Thus, we exclude the 17 takeovers that happen between the school years 2002/03 and 2004/05 for which we only observe two or fewer pre-conversion years.[3]

The table aims to introduce the reader to the identification strategy we adopt to study the effects of interest. Column 1 reports school and teacher characteristics of schools that have never been converted into Sponsor-led academies by 2018/19. The figures are averages (and standard deviations) computed from 2002/03 to 2014/15. Column 2 reports the same characteristics computed for schools that experience a takeover between 2005/06 and 2015/16. These are the "cohorts" of school takeovers that we aim to include in our treatment group primarily because we can observe the outcomes of interest in these schools for at least three years before and two years after the conversion. The figures in Column 2 are calculated over the three years before the conversion of each of these cohorts of academies. Finally, Column 3 reports teacher and school characteristics over this same period, for cohorts of schools that experienced the takeover 4 years after each cohort of schools included in Column 2.

Two main facts emerge from Table 1. First, while schools that never experience a takeover over the period considered (Column 1) appear different from schools that eventually become Sponsor-led academies (Columns 2-3) along many dimensions, schools that experience a take

[3]Also, we do not consider newly created Sponsor-led academies, for which we would not have pre-treatment data (32 schools); we also exclude conversions from the CTCs which were already enjoying high autonomy or conversions of private schools (23 schools); finally we disregard conversions from schools operating at different phases of education or conversions from special schools to focus on secondary schools only (70 schools).

over sooner or later are much more similar to each other over the three years before schools in Column 2 are converted. Specifically, ever sponsor-managed schools have a (60-80 percent) larger proportion of pupils eligible for free school meals, a (20-40 percent) smaller proportion of pupils achieving a sufficient standard in grade-11 standardized exams (corresponding to 5 Cs), are (2-3 times) more likely to be classified as "requires improvements" or "inadequate" by OFSTED, are (6-10) more likely to be urban schools, and have a (6-7 percent) lower proportion of teachers with a master degree. The second important point emerging from this table is that, compared to later conversions, schools experiencing earlier takeovers tend to have fewer pupils and a larger share of teachers leaving the schools before their conversion. We will return to this in the next section to discuss to what extent these two factors could influence the timing of conversion.

4 Identification strategy

To identify the causal impact of management flexibility on teachers' selection and turnover, we focus on schools that eventually become Sponsor-led academies over the period considered, and adopt a difference-in-differences (did) strategy that compares the evolution of the outcomes of interest in schools that acquire academy status in a certain year and in schools that convert k years after. We will discuss below how we choose k in our main specification, and how we challenge this choice in the robustness check section. As for the treated cohorts, we consider conversion from 2005/06 onwards, for which we have at least 3 pre-conversion years on the main outcomes of interest. Note that our estimation sample will comprise several pairs of treated and control groups. For instance, we will compare schools converting in 2005/06 to schools converting k years after, schools converting in 2010/11 to schools converting k years after, and so on. We can think about these pairs of conversions cohorts as being different sub-samples that we stack together in the final estimation sample. This design implies that once a school is treated, we will not use it as control for schools converting in subsequent years, which allows us to avoid the "forbidden comparisons"

described in Borusyak et al. (2021). Our resulting regression model looks as follows:

$$Y_{st} = \alpha_s + \theta_t + \beta\ SponsoredAcademy_{st} + X'_{st}\pi + u_{st}, \quad (1)$$

where s stands for a school that acquires academy status in year c (treated group) or $c+k$ (control group). In the main specification, we choose t to go from $c-3$ to $c+2$. Y_{st} is the outcome of interest, which is either a measure of teacher turnover, as described below, teachers' characteristics such as gender, age, educational background, or experience, school expenditure, or pay dispersion, as defined later; α_s are θ_t are, respectively, school- and year-fixed effects; $SponsoredAcademy_{st}$ is a dummy variable equal to one in treated schools from the year the conversion takes place onward; in our main specification we do not include further controls, but we will show that our results are practically unchanged when including LA times year-fixed effects to control for factors that vary over time at the LA level and could affect both a school's conversion prospects and its outcomes, such as the share of academies in the LA, or the political party in power in the local authority. Finally, we will use heteroskedasticity-robust standard errors clustered at the school level.

To test the parallel-trend assumption and study the dynamic impact of the academy conversion on the outcomes of interest, we also present event-study estimates obtained by running the following dynamic specification:

$$Y_{st} = \alpha_s + \theta_t + \sum_{e=-2}^{2} \beta_e(SponsoredAcademy_s * \mathbf{1}[t-c=e]) + X'_{it}\pi + u_{st}, \quad (2)$$

where c is the conversion year for the treatment group and $\mathbf{1}[t-c=e]$ is an indicator variable that takes value 1 when $t-c=e$ and 0 otherwise, and e here refers to the year relative to the conversion year. In what follows, we will take the event year -3 as the reference period.

In our main specification, we choose as control group schools that experience a management takeover 4 years after the treated group. The main benefit of using the 4-year time window between treated and control cohorts is that it allows us to study dynamic effects of the takeover up to at least

2 years after the event (when control cohorts are still two years apart from converting). Moreover, while we cannot argue that the timing of takeovers is random, Table 1 shows that these two groups of schools are comparable in many dimensions. To further support the validity of our identification strategy, we will also show that our results are robust to changes in the conversion cohorts included in the control group.

To conclude, note that, because our objective here is to estimate the impact of the conversion on teacher turnover and composition, we can estimate both regressions 1 and 2 at the school-level.

5 School performance, leadership change and teacher turnover

5.1 OFSTED performance

Every three to five years - and more often if a school is under-performing, the independent authority OFSTED performs two-day long school inspections to evaluate the school management, teaching quality, and the overall effectiveness of the school at providing an appropriate and safe learning environment for its pupils. On each dimension (overall effectiveness, teaching, and management quality), schools are rated on a scale of 4 scores, with 1 for outstanding, 2 for good, 3 for "requires improvement", and 4 for schools are judged inadequate. Figure 2 shows the evolution of the likelihood of being deemed outstanding on each dimension in treated vs. control schools around the years of the takeover.[4] While there is no differential trend in this probability before treated schools experience the takeover, in just two years after this is completed, the likelihood of receiving an outstanding score for the school's overall performance increases by 10 p.p., or almost 6 times from the pre-takeover mean. Importantly, both the probability of obtaining an outstanding score for teaching and management quality also increase by, respectively, 4 and 6 times. To understand how the Sponsor could achieve such a large improvement, we now study the impact on the takeover on 3 mechanisms: the headteacher' selection, changes in teachers' composition, and the Sponsor's pay policy.

[4]We assign the score of the last inspection to years in which a school does not receive an inspection.

5.2 Headteacher's selection

One of key responsibilities that the academy's board of trustees acquires is that of appointing the school headteacher. Figure 3 shows that the probability of nominating a new principal increases by 8 p.p. the year when the takeover has started and by 35 p.p. the year that the conversion has been completed, or more than two times compared to the pre-conversion mean. Appendix Figure A.2 shows that this effect is partly driven by an increase in the probability of promoting a new head internally, which increases by 50 percent compared to the pre-conversion mean. But it is above all the probability of hiring (promoting) a new head from a different school, and the likelihood of appointing a new head who previously worked in a different sector that drive the main effect, with both probabilities doubling compared to the pre-conversion mean. Importantly, Table 2 shows that the new headteacher tends to be younger (2 percent increase), better paid (7 percent increase), and, respectively, 2 to 3 times more likely to come from a different LA and an outstanding school (as certified by the independent inspection authority, the Office for Standards in Education, or OFSTED).

5.3 Teacher turnover

Figure 4 presents event-study estimates obtained by running regression 2 on the (log of the) number of pupils enrolled in the school (Panel A), the (log of the) number of teachers (Panel B), the share of teachers leaving the school between one year and the next (Panel C), and the share of new teachers (Panel D). As anticipated, students numbers start decreasing in treated schools compared to control schools already 2 years before the takeover takes place, relative to the reference event year -3. On the one hand, it is possible that rumors about the takeover start spreading already 2 years before this happens, which may push some parents not to enroll (or to withdraw) their children in (from) the school. On the other hand, we cannot exclude that a downward trend in pupils' numbers may have influenced the timing of conversion. As for teachers, their numbers also start declining before the conversion, and the event study in Panel C shows that this is primarily due to an increase in separations, which spike between the pre-conversion year and the year the takeover is completed.

Importantly, all these dynamics are completely reversed as treated schools experience the takeover. Moreover, the takeover also leads to a stable and significant increase in the share of new hired teachers (an average increase of 4 p.p., or 27 percent compared to the pre-conversion mean).

In turn, Table 3 shows that these effects on teacher turnover result into important changes in teachers' composition towards younger (2.5 percent increase) and less experienced teachers (5 percent increase), but also teachers who obtained top grades in education (20 percent increase), and are 70 percent more likely to come from an outstanding school and 0.3 p.p. more likely to come from the same school as the new head (from a pre-conversion 0 probability). Appendix Tables A.1 and A.2 further decompose these effects into the impact on the composition of new hires and teachers leaving the school. Appendix Table A.1 suggests that new school manager tends to hire teachers based on available signals of quality, as new hires from other schools tend to come from outstanding schools themselves or even the same school as the new head, while novice teachers coming from outside the educational sectors tend to be high-achievers in education. As for teachers leaving the schools, teachers moving to another secondary school tend to be older and less likely to be high-achievers in education, while the composition of teachers moving to another sector is similar before and after the takeover.

Robustness checks. Figures 5 and 6 present alternative specifications that partially address the issue of pre-trends in pupils' and teachers' numbers. For this, in Figure 5 we estimate event-studies where the control group includes all cohorts that convert 1 to 4 years after the treated group, while in Figure 6, we include in our main specifications local authority specific time shocks. Not only all results are practically unchanged compared to our main specification, but more importantly the evolution of pupils' and teachers' numbers is more comparable across treated and control groups in the pre-treatment period.

Longer post-period. In our main specification, we only study dynamic effects of school takeovers until 2 years after this event takes place. In this section, we extend the horizon of analysis up to 4 years after the school takeover. To do this, in Figure 7, we use as control group only cohorts that experience a takeover 6 years after the treated group, and exclude cohorts converting between

2013/14 and 2014/15 from the treatment group, for which we would not have such a control group. Interestingly, the dynamic effects estimated over the first two years persist over a longer horizon. In particular, the positive trends in pupils' and teachers' numbers that the takeover activates continue over the following fours years, with the dynamics in teachers' numbers driven both by a decrease in teachers' separations and persistent increase in new hires.

5.4 Teachers' pay

While Sponsor-led academies are financed through public funding, as their predecessors, one of the key dimensions over which the sponsor acquires autonomy concerns the allocation of resources. In particular, sponsors may re-design teachers' reward policies and also set teachers' pay based on criteria other than seniority. To investigate these decisions, we analyze the impact of the takeovers on teachers' annual pay, pay dispersion, and school expenditure.

We first look at incumbent teachers, that is teachers who were already employed at the school the year before the takeover and are still in the school when the takeover takes place. We compare the evolution of their annual pay with that of teachers who, over those years, were employed at schools that only convert 4 years after the control group. We run this regression at the teacher-level and control for teacher-fixed effects, on top of school- and year-fixed effects:

$$Y_{ist} = \gamma_i + \alpha_s + \theta_t + \beta\ SponsoredAcademy_{st} + u_{ist}, \tag{3}$$

where i is a specific teacher, and Y_{ist} is the log of teachers' annual pay. We follow incumbent teachers from 3 years before the school conversion till 2 years afterwards, irrespective of whether they were already employed at the school before the event year -1, or after the conversion. In this respect, the β coefficient in regression 3 could be considered an intention-to-treat (ITT) estimate.

When considering newly hired teachers, we compare the pay dynamics of teachers hired both the year of the takeover and the year after in treated vs. control schools, from 3 years before the

takeover to 2 years afterwards.[5]

To measure pay dispersion, we follow Biasi (2021) and first estimate a regression of teachers' annual pay on years of experience, gender, level of education, and school times year-fixed effects[6] We then take the standard deviation of the residuals from this regression, divide it by teachers' average annual pay, and study the evolution of this variable at the school-level.

Panel A of Figure 8 shows that incumbent teachers' pay exhibits a comparable evolution in treated and control schools before the takeover, but incumbent teachers experience a significant 2 percent increase after the school takeover in treated schools compared to control ones. Similarly, new hires experience a 4 percent increase in their annual pay upon arrival in converted schools (Panel B). Finally, Panel C shows that pay dispersion across equally experienced/educated teachers also progressively increases after the takeover, resulting into an average 10 percent significant increase compared to the pre-conversion mean.

A further investigation of teachers' pay data, which we report in Appendix Figure A.3, reveals that Sponsors decisively abandon the widespread practice of the predecessor school to differentiate teachers' pay by allocating some teachers to specific tasks, such as coordinating teachers of a certain subject, or supervising specific projects. Instead, they use primarily the contractual pay to reward teachers, though relying on criteria other than seniority and education, as the results on pay dispersion reveal.

To further understand how Sponsors manage the school resources and provide additional support to our interpretation on the effects on teachers' pay, we exploit school expenditure data, available for schools takeovers taking place from 2010/11 onward. As explained in Section 2, Sponsors receive a one-off grant to cover the costs of the conversion. Panel A of Appendix Figure A.4 shows indeed that, while the evolution of school funding is comparable in treated and control school before the takeover, it increases by 10 percent the year of the takeover in converted schools,

[5]This implies that we observe teachers hired at time 0 from 3 years before to 2 years after this event. In contrast, we observe teachers hired the year after the conversion from 4 years before the hiring happens to 1 year afterwards. In the event-study specification, we create a lead "-3 or before" and a lag "1 year or after" to take this differential timing into account.

[6]To estimate this regression, we restrict the sample to full-time teachers to avoid capturing variations in hours worked.

but rapidly reverses to the level of control schools over the following two years. In turn, school expenditure also increases but more gradually across the years following the takeover.[7] Importantly, sponsors use their resources as follows: they strongly decrease expenditure on temporary staff, such as supply teachers or support staff, while using most of this money on non-teaching personnel, including the headteacher. In the conversion year, they also allocate some funding to other running costs, such as improving the school building. Importantly, and consistently with the fact that sponsors merely restructure teachers' rewarding policies, expenditure on regular teachers does not change in treated schools compared to control schools after the takeover.

Robustness checks. To conclude this section on the impact of school takeovers on teachers' pay, Figure 9 shows that also these results, as in the case of school-level outcomes, are robust to the inclusion of local-authority specific shocks among the regressors.

Longer post-period. Finally, Figure 10 show that the restructuring of teachers' pay rewarding scheme promoted by sponsor-managers appears to be a long-term decision, as both teachers' pay and pay dispersion among equally educated/experienced teachers remain higher in treated schools compared to control schools up to 4 years following the takeover.

6 Conclusion

Disadvantaged schools notoriously struggle to attract and retain high-quality teachers (Clotfelter et al. 2008, Glazerman et al. 2013, Springer et al. 2016, Swain et al. 2019, Benhenda 2020, Bobba et al. 2021, Morgan et al. 2023). Failing, high-poverty public schools notoriously struggle to attract and retain good teachers. This paper studies a setting where successful businesses or educational charities take over the management of low-performing schools, while funding remains public. Exploiting the staggered expansion of English Sponsor-led academies since the early 2000s, we show that the new business-oriented management completely transforms under-

[7] An important caveat of these data is that they do not include capital spending, so that expenditure on a new building would not show up in these data, for instance, and anecdotally many Sponsor-led academies chose to move the school to a brand-new building (Adonis 2012.

performing schools, which, in just a few years, are able to obtain outstanding grades by the independent inspection authority, OFSTED, both in terms of overall effectiveness, and specifically in terms of teaching and management.

To generate such improvements, Sponsors strongly innovate their personnel policy, leading to profound changes in the teaching body. First, upon the takeover, the probability that the Sponsor appoints a new headteacher doubles compared to the pre-takeover mean, with new the headteacher being, on average, younger, better paid, and more likely to come from outstanding schools. The composition of the teaching body also changes towards younger and less experienced teachers, but also teachers who achieved top grades in education and are more likely to come from an outstanding school and the same school as the new head. Finally, Sponsors substantially restructure teachers' rewarding scheme and abandon a pay scale entirely based on seniority and education, leading to an increase in pay dispersion across equally experienced/educated teachers.

Previous studies have found that English Sponsor-led academies have been successful at improving students' school performance and educational attainment (Eyles et al. 2016, Andrews et al. 2017, Eyles and Machin 2019). Our results complement these papers, by showing that injecting business-like practices, ethos and vision into failing schools appears to be a winning strategy to attract and retain high-quality teachers. Importantly, our analysis suggests that this policy helps leveling the playing field, as both the headteacher and teachers appointed by the new management are more likely to come from outstanding schools. An important avenue for future research is the analysis of spillover effects of school takeovers to nearby schools, as the expansion of Sponsor-led academies is likely to have increased competition for the best teachers (Jackson 2012).

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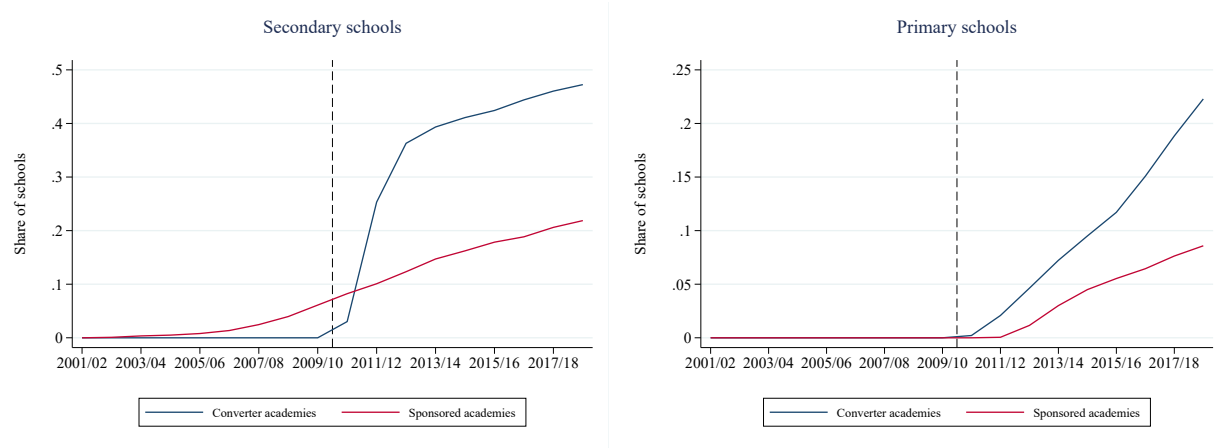
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7 Graphs and Tables

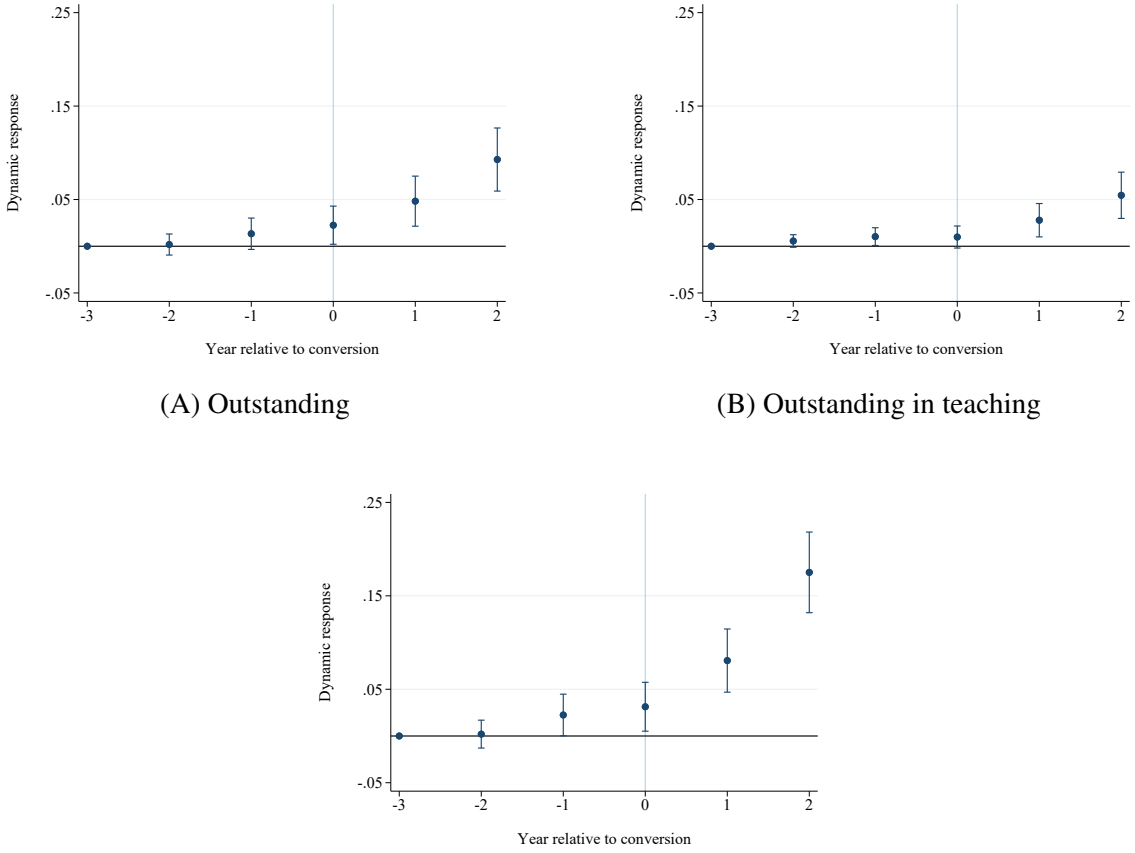
Figure 1: Expansion of academies among English schools



Source: GIAS, 2001/02-2018/19.

Notes: These graphs represent the expansion of academies over time in English secondary and primary schools.

Figure 2: Performance in OFSTED inspections



(A) Outstanding

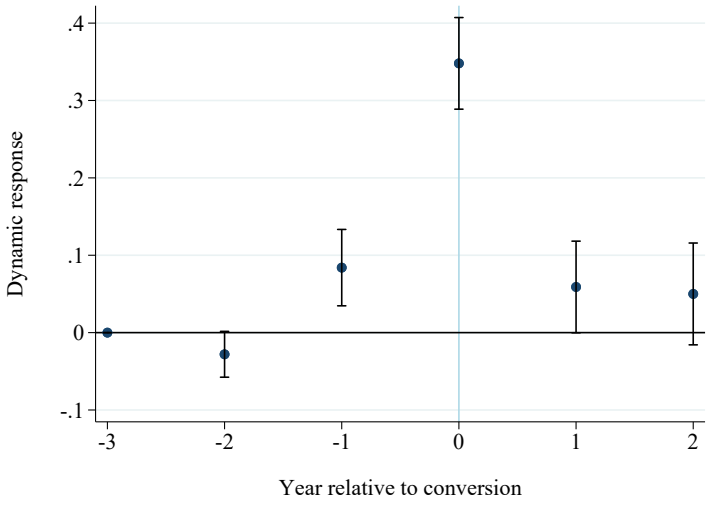
(B) Outstanding in teaching

(C) Outstanding in management

Source: DTR, 2005/06-2009/10, SWC, 2010/11-2018/19.

Notes: This graph presents the dynamic impact of school takeovers on the probability of obtaining an outstanding score in OFSTED inspections, estimated by running regression 2. The estimation sample includes schools that convert between 2008/09 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

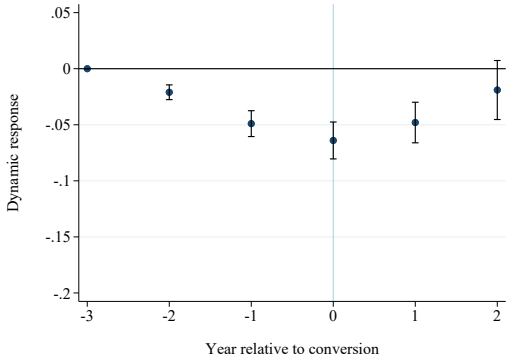
Figure 3: Probability of appointing a new headteacher



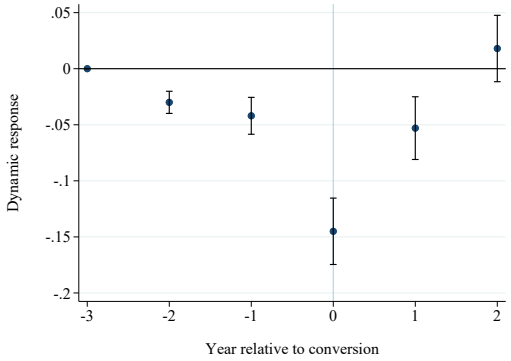
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This graph presents the dynamic impact of school takeovers on the probability that the school appoints a new headteacher, estimated by running regression 2. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

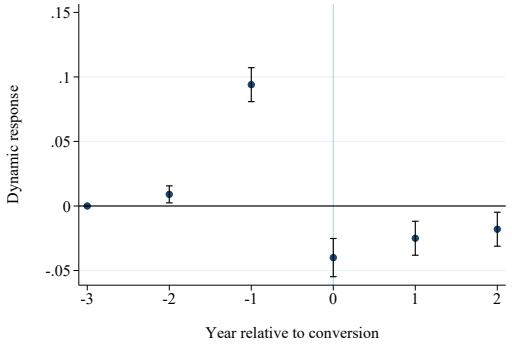
Figure 4: Teacher turnover



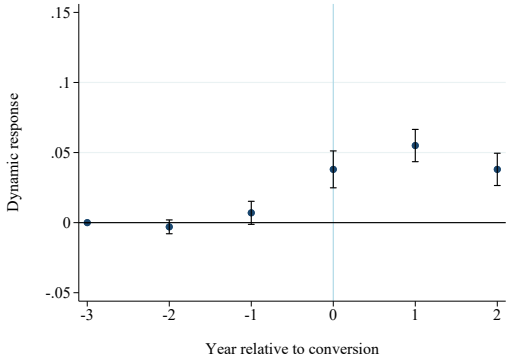
(A) Number of pupils



(B) N of teachers



(C) Share of teachers leaving in t+1

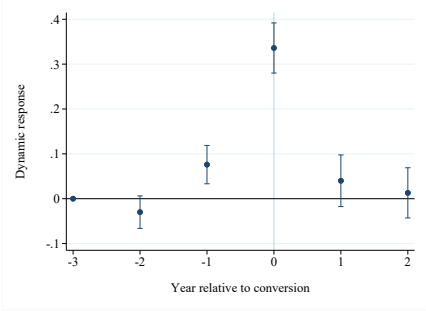


(D) Share of new hires

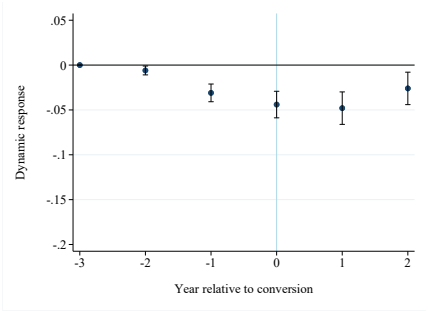
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teacher turnover. These results are estimated by running regression 2 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

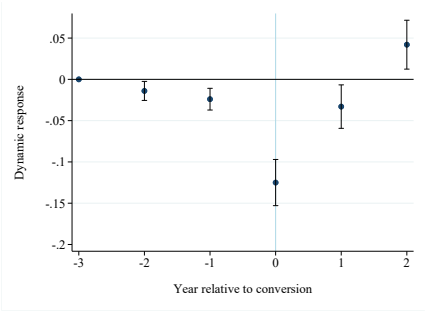
Figure 5: New headteachers and teacher turnover - different control group



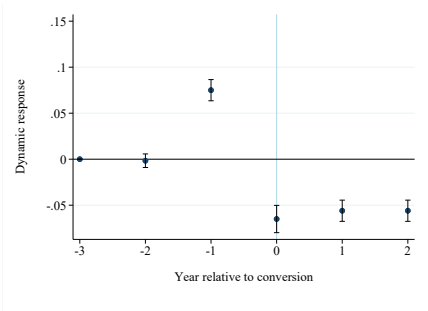
(A) New headteacher



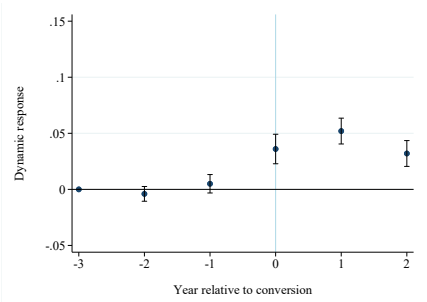
(B) Number of pupils



(C) Number of teachers



(D) Share of teachers leaving in t+1

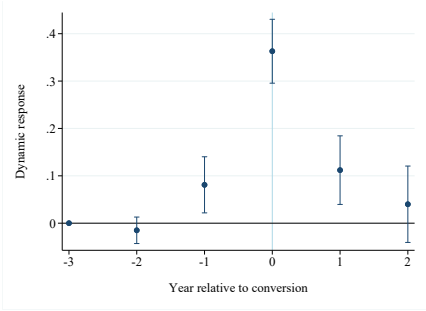


(E) Share of new hires

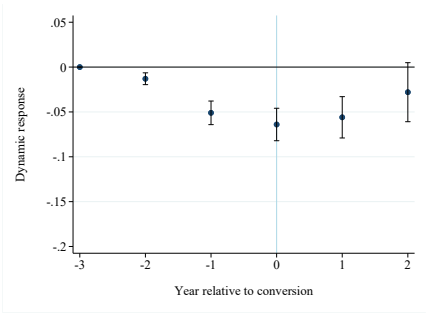
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on the probability of appointing a new headteacher and teacher turnover. These results are estimated by running regression 2 on the outcomes displayed in each graph, using as control group all cohorts converting from 1 to 4 years after the treated group. The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

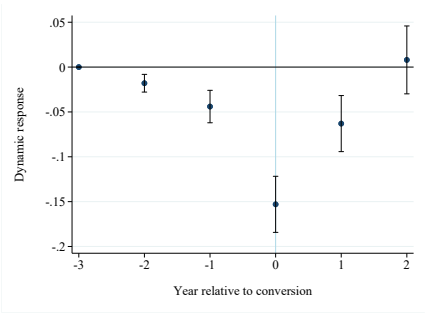
Figure 6: New headteachers and teacher turnover - la-specific time shocks



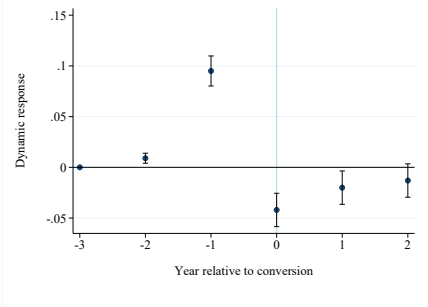
(A) New headteacher



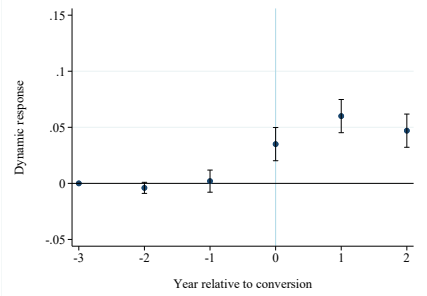
(B) Number of pupils



(C) Number of teachers



(D) Share of teachers leaving in t+1

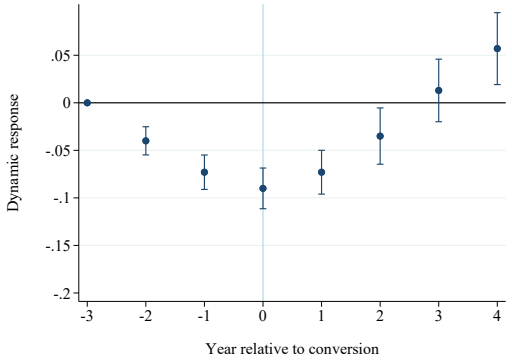


(E) Share of new hires

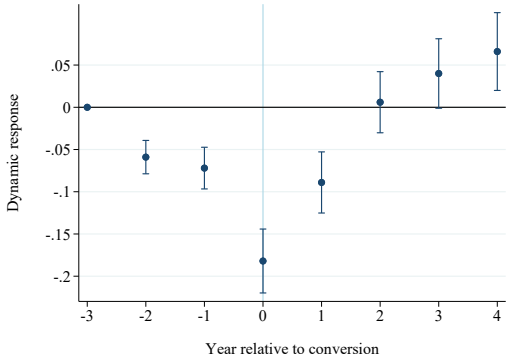
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on the probability of appointing a new headteacher and teacher turnover. These results are estimated by running regression 2 on the outcomes displayed in each graph, and further including local-authority specific time-shocks among the regressors. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

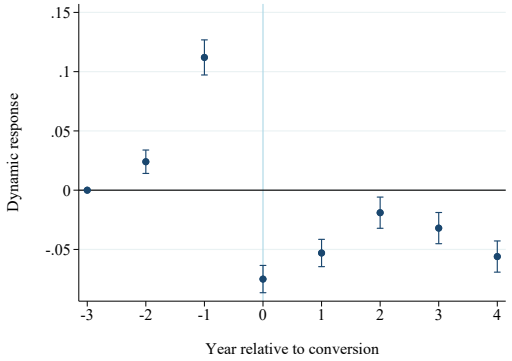
Figure 7: Teacher turnover - longer horizon



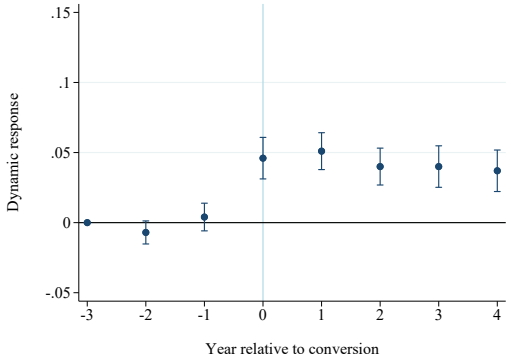
(A) Number of pupils



(B) N of teachers



(C) Share of teachers leaving in t+1

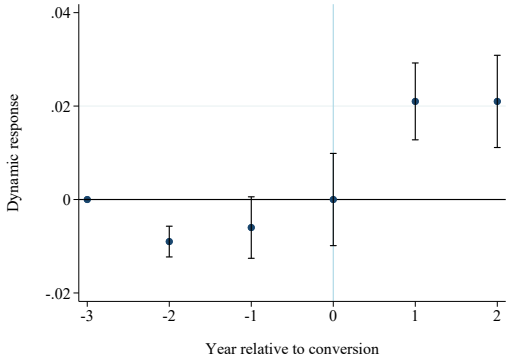


(D) Share of new hires

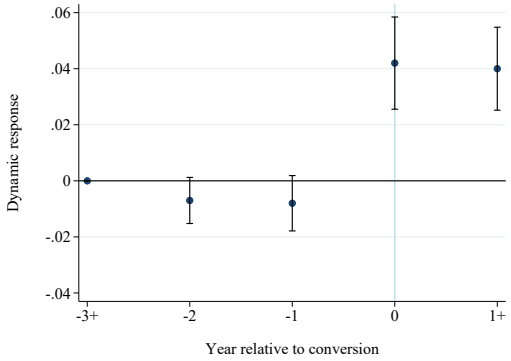
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teacher turnover. These results are estimated by running regression 2 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2012/13 (treated schools) and schools that convert 6 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 4 years following this event. 90-percent confidence intervals are also reported.

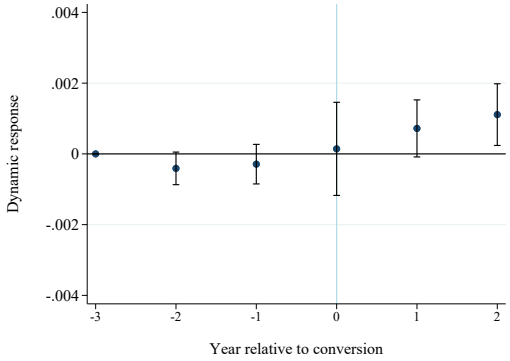
Figure 8: Teachers' pay



(A) Incumbent teachers' pay



(B) New hires' pay

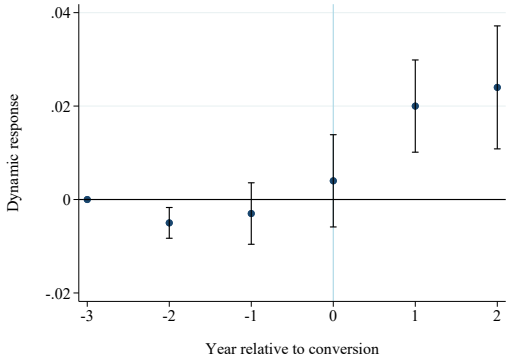


(C) Pay dispersion - FT teachers

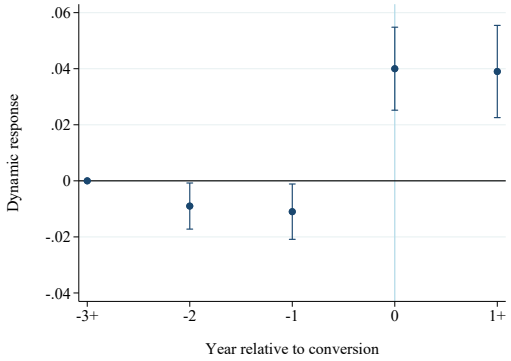
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teachers' pay. These results are estimated by running the dynamic specification of regression 3 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

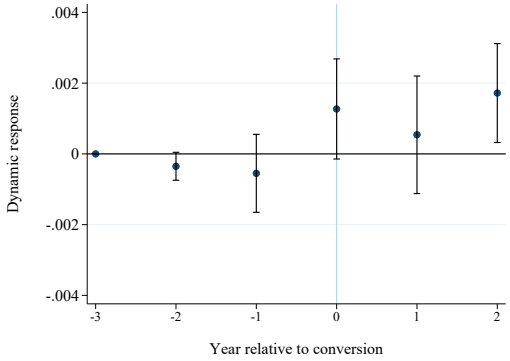
Figure 9: Teachers' pay - la-specific time shocks



(A) Incumbent teachers' pay



(B) New hires' pay

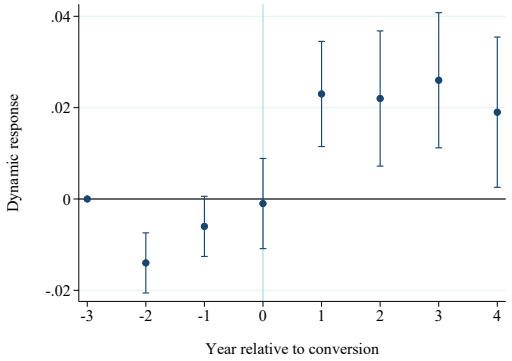


(C) Pay dispersion - FT teachers

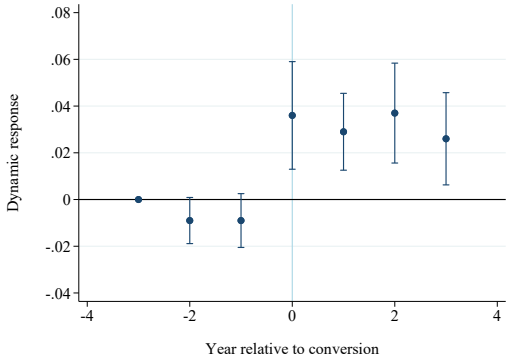
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teachers' pay. These results are estimated by running the dynamic specification of regression 3 on the outcomes displayed in each graph, and further including local-authority specific time-shocks among the regressors. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

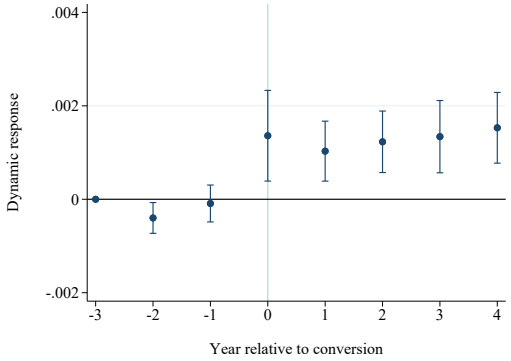
Figure 10: Teachers' pay - longer horizon



(A) Incumbent teachers' pay



(B) New hires' pay



(C) Pay dispersion - FT teachers

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teachers' pay. These results are estimated by running the dynamic specification of regression 3 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2012/13 (treated schools) and schools that convert 6 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 4 years following this event. 90-percent confidence intervals are also reported.

Table 1: Summary statistics

	Never converted 2002/03 to 2014/15	Conversions btw 2005/06 to 2014/15 3 to 1 year before conversion of schools in Col 2	Conversions 4 years later
	(1)	(2)	(3)
School characteristics			
N pupils	1,016	927	1,045
	394	354	377
% FSM students	0.13	0.24	0.21
	0.12	0.12	0.12
% students with 5A*C	0.58	0.36	0.40
	0.18	0.12	0.13
% OFSTED low score	0.29	0.82	0.65
	0.45	0.39	0.48
% in High-earnings LA	0.51	0.45	0.43
	0.50	0.50	0.50
% in urban LA	0.84	0.92	0.89
	0.37	0.27	0.31
Teachers' characteristics			
N teachers	59	60	62
	27	23	24
Pupil-teacher ratio	17	15	17
	4	3	4
% New hires	0.15	0.15	0.15
	0.09	0.08	0.09
% Leaving in t+1	0.15	0.21	0.14
	0.10	0.13	0.08
% Female	0.62	0.61	0.60
	0.09	0.07	0.07
Age	40	40	39
	3	2	2
Experience	14	14	14
	3	2	2
% Master or above	0.67	0.62	0.63
	0.10	0.10	0.10
% Top GPA in edu	0.06	0.05	0.05
	0.08	0.07	0.07
% Part-time	0.15	0.12	0.11
	0.09	0.07	0.08
Annual basic pay	37,242	36,571	37,309
	3,654	3,149	3,042
Share additional payments	0.04	0.06	0.05
	0.03	0.03	0.03
N schools	2,700	386	517

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents summary statistics (mean and standard deviation) of school, pupils, and teachers' outcomes for three groups of schools. The first column refers to schools that never become sponsored academies throughout the period considered. The figures in Column 1 are calculated over the period 2002/03-2014/15. The second column refers to schools that become sponsored academies between 2005/06 and 2014/15, and the figures are calculated over the three years prior to the conversion year. The third column refers to schools that convert 4 years after the schools in Column 2, and the figures are calculated over the same period as in Column 2.

*** p<0.01, ** p<0.05, * p<0.1.

Table 2: Changes in headteacher characteristics

	Fem	Age	Years of experience	Master or above	Top GPA in education	Part-time	Log annual pay	Coming from other LA	Coming from outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sponsored academy	-0.038	-0.994***	-0.755	0.012	-0.018	-0.009	0.070**	0.136***	0.030***
	(0.030)	(0.416)	(0.474)	(0.029)	(0.030)	(0.007)	(0.013)	(0.017)	(0.010)
Observations	5388	5388	5388	5388	1422	5388	5388	5388	4040
N Schools	599	599	599	599	261	599	599	599	570
Pre-SA Mean T	0.44	50	27	0.61	0.08	0.02	86560	0.06	0.01
Pre-SA Mean C	0.40	50	28	0.62	0.05	0.01	89337	0.09	0.01
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: DTR, 2001/02-2008/09, SWC, 2010/11-2018/19.

Notes: This table presents the impact of school takeovers on the headteacher's characteristics. These results are estimated by running regression 1 on the outcomes displayed on top of each column. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event.

*** p<0.01, ** p<0.05, * p<0.1.

Table 3: Changes in teachers' characteristics

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Same school as new head	Coming from other LA	Coming from outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sponsored academy	-0.005*	-0.790***	-0.652***	0.003	0.009**	0.006***	-0.013***	-0.002	0.003***	0.016***	0.007***
	(0.003)	(0.100)	(0.096)	(0.003)	(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.003)	(0.001)
Observations	5501	5501	5501	5501	5497	5501	5501	5501	5501	5501	4722
N Schools	600	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.61	40	14	0.61	0.05	0.01	0.12	10.57	0.00	0.05	0.01
Pre-SA Mean C	0.60	40	14	0.62	0.05	0.00	0.11	10.58	0.00	0.04	0.01
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

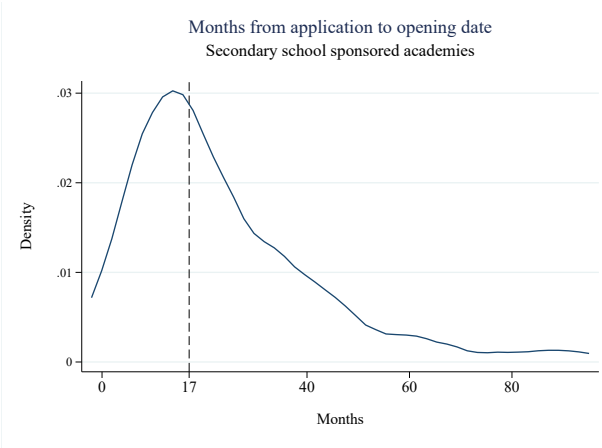
Source: DTR, 2001/02-2008/09, SWC, 2010/11-2018/19.

Notes: This table presents the impact of the academy conversion on teachers' characteristics. These results are estimated by running regression 1 on the outcomes displayed on top of each column. The estimation sample includes schools that convert between 2002/03 to 2015/16 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample.

*** p<0.01, ** p<0.05, * p<0.1.

Appendix

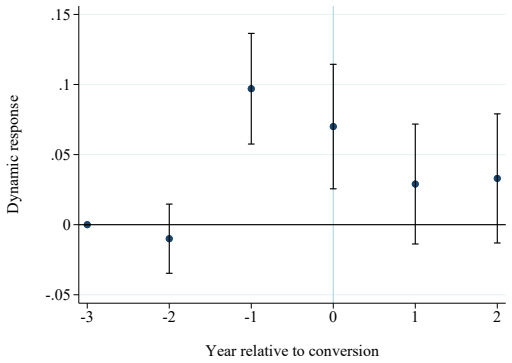
Figure A.1: Months from application to conversion



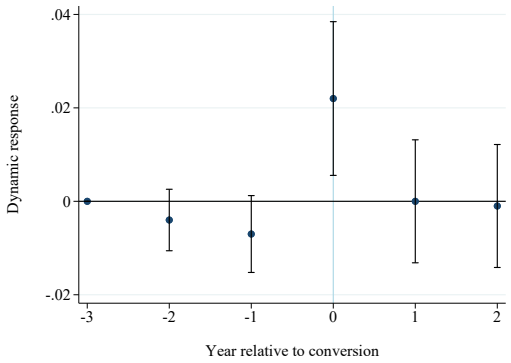
Source: GIAS, 2010/11-2018/19.

Notes: This graphs report the distribution of the number of months between the application date and the conversion date among the 20 percent of schools converting into sponsored academies after 2010/11 that have provided these data to the DfE.

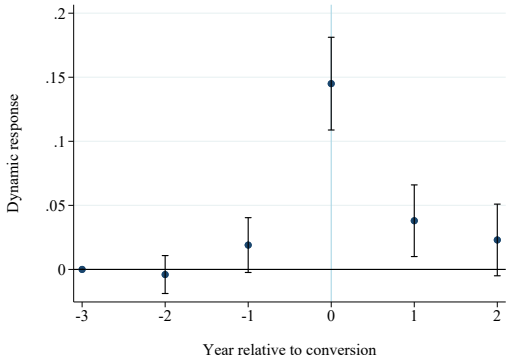
Figure A.2: Probability of appointing a new headteacher - further results



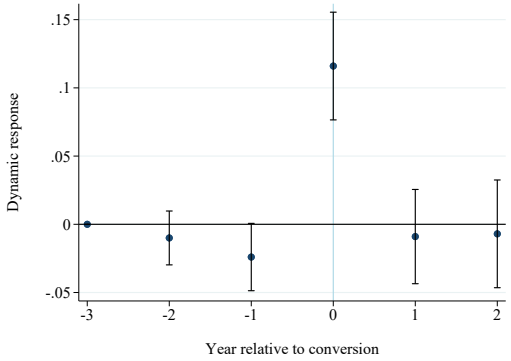
(A) New head promoted internally



(B) New head hired from other sector



(C) New head hired from other school

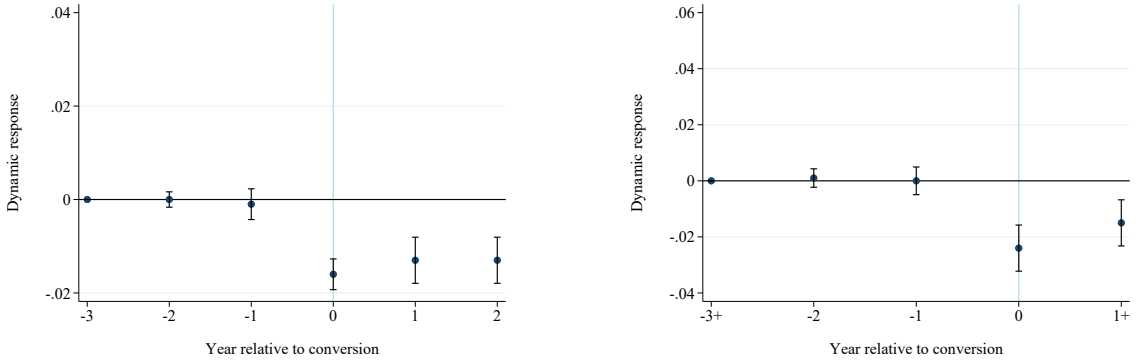


(D) New head promoted from other school

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of the academy conversion on the probability that the school changes head. These results are estimated by running regression 2 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence interval are also reported.

Figure A.3: Additional payment share in teachers' pay



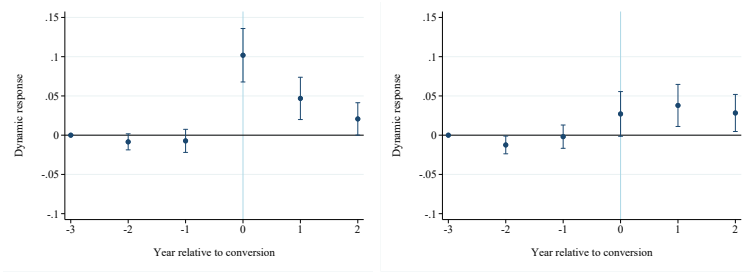
(A) Incumbent teachers' pay

(B) New hires' pay

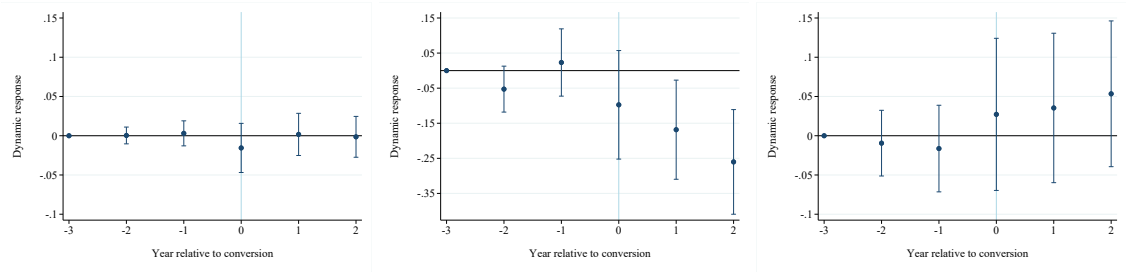
Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on teachers' additional pay. These results are estimated by running the dynamic specification of regression 3 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

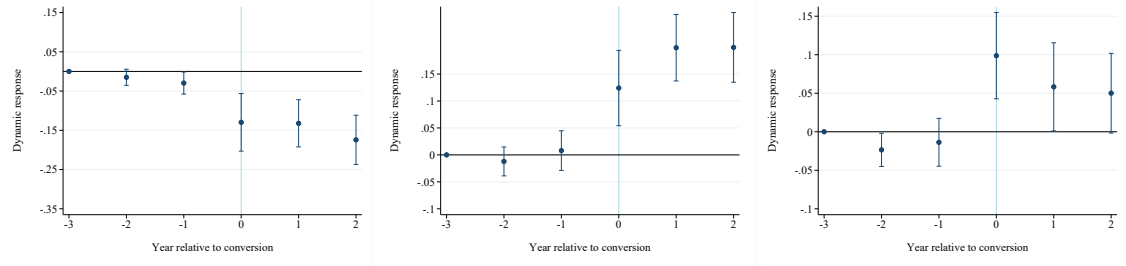
Figure A.4: Schools' resources and expenditure



(A) Resources and expenditure



(B) Expenditure on teaching staff and educational resources



(C) Other expenditure

Source: SWC, 2010/11-2018/19.

Notes: These graphs present the dynamic impact of school takeovers on schools' resources and expenditure. These results are estimated by running regression 2 on the outcomes displayed in each graph. The estimation sample includes schools that convert between 2010/11 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

Table A.1: Changes in characteristics of new hires

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Same school as new head	Coming from other LA	Coming from outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
From other school											
Sponsored academy	-0.005	0.128	0.194	-0.012	-0.007	0.007**	-0.001	0.053***	0.014***	0.021	0.040***
	(0.016)	(0.319)	(0.304)	(0.016)	(0.014)	(0.003)	(0.011)	(0.012)	(0.003)	(0.016)	(0.012)
Observations	5018	5018	5018	5018	3311	5018	5018	5018	5018	5018	4786
N Schools	600	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.57	37	10	0.68	0.07	0.00	0.10	10.51	0.00	0.64	0.10
Pre-SA Mean C	0.57	37	10	0.66	0.04	0.01	0.10	10.52	0.00	0.65	0.09
From other sector											
Sponsored academy	0.002	0.141		0.002	0.016	0.019**	-0.035***	0.054***			
	(0.016)	(0.336)		(0.018)	(0.017)	(0.007)	(0.011)	(0.011)			
Observations	4672	4672		4672	3367	4672	4672	4672			
N Schools	599	599		599	574	599	599	599			
Pre-SA Mean T	0.65	31		0.61	0.07	0.03	0.11	10.10			
Pre-SA Mean C	0.65	31		0.65	0.08	0.01	0.11	10.12			

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents the impact of the academy conversion on the characteristics of new hired teachers. Panel A refers to teachers hired from other secondary schools, Panel B to teachers hired from outside the educational sector or schools in other phases of education. These results are estimated by running regression 1 on the outcomes displayed on top of each column. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample.

*** p<0.01, ** p<0.05, * p<0.1.

Table A.2: Changes in characteristics of teachers who leave

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Going to other LA	Going to outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
To other school										
Sponsored academy	-0.023	0.480*	0.313	-0.019	-0.036**	0.003	-0.005	0.027***	- 0.024*	-0.013
	(0.015)	(0.269)	(0.271)	(0.014)	(0.016)	(0.004)	(0.010)	(0.010)	(0.013)	(0.011)
Observations	5149	5149	5149	5149	3834	5149	5149	5149	5149	4400
N Schools	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.59	36	10	0.68	0.07	0.01	0.10	10.48	0.64	0.16
Pre-SA Mean C	0.58	35	9	0.68	0.07	0.01	0.10	10.46	0.65	0.15
To other sector										
Sponsored academy	0.011	-0.443	-0.224	-0.018	0.018	0.002	-0.022	0.022		
	(0.018)	(0.460)	(0.571)	(0.019)	(0.017)	(0.004)	(0.017)	(0.015)		
Observations	4045	4045	4045	4045	2780	4045	4045	4045		
N Schools	593	593	593	593	593	593	593	593		
Pre-SA Mean T	0.59	45	19	0.47	0.06	0.01	0.25	10.42		
Pre-SA Mean C	0.61	43	18	0.49	0.07	0.01	0.26	10.43		

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents the impact of school takeovers on the characteristics of teachers who leave the school. Panel A refers to teachers leaving for other schools, Panel B to teachers leaving the educational sector or leaving for a school in a different phase of education. These results are estimated by running regression 1 on the outcomes displayed on top of each column. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample.

*** p<0.01, ** p<0.05, * p<0.1.